PROVISIONAL PATENT APPLICATION: WEARABLE IoT & AUDIO-SPATIAL TELEMETRY

Invention Title: AUDIO-SPATIAL TELEMETRY NODE FOR USER-DEFINED ACOUSTIC FINGERPRINTING, UNIVERSAL EMERGENCY SIGNAL OVERRIDE, SELECTIVE SIGNAL ATTENUATION, AND BIOMETRIC IoT ROUTING

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1. The Field of Invention

This invention relates to wearable computational audio devices, digital signal processing (DSP), and connected IoT telematics. Specifically, it introduces a localized acoustic firewall capable of semantic audio recognition, featuring both a pre-loaded global emergency signature database and user-defined acoustic programming. These systems dynamically interrupt media playback to deliver critical auditory alerts while actively filtering out unprogrammed ambient noise, integrated within a broader smart-city vehicle-to-pedestrian (V2P) safety network.

2. The Technical Problem

Modern headphones and wearable audio devices employ Active Noise Cancellation (ANC) which indiscriminately isolates the user from their environment. This poses severe, often fatal pedestrian and driver safety risks, as users routinely fail to hear approaching emergency vehicles (police, fire, ambulance) in time to clear a path. Current audio pass-through systems (e.g., "Transparency Modes") force the user to endure all chaotic ambient noise to remain safe, creating auditory fatigue. Furthermore, while emerging connected-vehicle (V2X) technologies offer digital warnings, they are useless against legacy emergency vehicles lacking smart-city transmitters.

3. The Technical Solution: The Hybrid Acoustic Firewall & IoT Node

The architecture elevates the wearable audio device into an AI-driven, hybrid acoustic firewall utilizing both pre-loaded global safety databases and localized user customization.

- The Universal Emergency Acoustic Database (UEAD): The device's localized memory module is pre-flashed with a comprehensive, global library of emergency vehicle acoustic signatures (e.g., standard siren sweeps, emergency airhorns, localized public alarm frequencies). The DSP continuously monitors the environment for these universal hashes, automatically overriding media playback to pass the emergency audio through the ANC wall, requiring zero user programming or smart-city infrastructure.

- User-Defined Acoustic Fingerprinting (The "Pin Drop" Protocol): For non-emergency personal use, the user actively records specific ambient sounds (e.g., a baby's cry, a door knock). The localized DSP generates a mathematical "Semantic Audio DNA" hash of the sequence to trigger selective interruption.

- Selective Signal Attenuation: When the ambient environment matches either a UEAD emergency signature or a "Pin Drop" programmed hash, the device instantly attenuates media playback and routes the critical sound into the audio feed. All unprogrammed noise remains blocked by the ANC firewall.

- V2X (Vehicle-to-Everything) Telemetry Handshake: For connected smart-cities, the node interfaces with municipal telematics, pre-empting ANC to deliver an audio-spatial directional warning upon receiving a digital handshake from an approaching autonomous vehicle.

- "ASS-ett" Parental Priority Override: Integrated with biometric network architecture, a verified guardian can remotely trigger a "Priority Override" in a dependent's wearable node to deliver direct voice communication.

- Audio-Spatial Ad-Injection: The node serves as an acoustic canvas for localized digital tokenization, verified by a localized biometric vocal primer.

4. DETAILED DESCRIPTION OF THE DRAWINGS (LOGIC FLOWCHARTS)

Flowchart 1: The "Pin Drop" User-Programming Protocol

- BOX 1: User initiates "Recording Mode" via the paired interface to capture a specific, non-emergency ambient sound.

- BOX 2: Localized DSP analyzes the power spectra, generating a unique Semantic Audio DNA hash.

- BOX 3: The system stores the unique hash locally on the wearable device's logic board.

Flowchart 2: The Universal Emergency Override Logic

- BOX 1: Wearable device is engaged in active media playback with ANC suppressing broad-spectrum ambient noise.

- BOX 2: External microphones continuously buffer 185-millisecond audio loops of the ambient environment.

- BOX 3: Internal processor cross-references the ambient buffer against the pre-loaded Universal Emergency Acoustic Database (UEAD) hashes.

- BOX 4 (Decision Node): Does the ambient buffer match a UEAD global emergency signature?

  - If NO: Proceed to Flowchart 3 (User-Defined cross-reference).
  - If YES: Proceed to BOX 5.

- BOX 5: Device triggers maximum priority attenuation, lowering media volume by 90%, disabling ANC for the emergency frequency range, and instantly routing the siren/alert into the user's feed to prevent collision.

Flowchart 3: Selective Interruption Logic (User-Defined)

- BOX 1: Buffer clears the UEAD scan (no emergency detected).

- BOX 2: Processor cross-references the ambient buffer against the locally stored "Pin Drop" user hashes.

- BOX 3 (Decision Node): Does the ambient buffer match a user-programmed hash?

  - If NO: ANC maintains total suppression. Media playback continues uninterrupted.
  - If YES: Device triggers standard dynamic attenuation to pass the programmed acoustic alert directly to the user.

Flowchart 4: V2X Telemetry & Priority Override

- BOX 1: Wearable device detects a localized cryptographic handshake from an approaching autonomous vehicle or an authorized parental network override command.
- BOX 2: System bypasses all media playback and acoustic fingerprinting protocols.
- BOX 3: System injects critical safety data via directional 3D audio routing, enforcing immediate user awareness of external hazards.

5. REPRESENTATIVE CLAIMS

- Claim 1: A wearable computational audio apparatus comprising: a localized microphone array; a digital signal processor; a localized memory module pre-loaded with a Universal Emergency Acoustic Database (UEAD) containing power spectra hashes of global emergency vehicle acoustic signatures; and a dynamic attenuation controller configured to continuously monitor ambient audio and automatically interrupt media playback to pass-through external audio strictly upon the localized detection of a UEAD emergency signature, while actively suppressing all non-emergency ambient frequencies.
- Claim 2: The apparatus of Claim 1, further comprising a user-programmable acoustic fingerprinting module configured to capture a user-directed environmental audio sample, generate a unique acoustic hash, and store said hash locally, wherein the dynamic attenuation controller is further configured to selectively interrupt media playback upon detection of said user-defined hash.
- Claim 3: The apparatus of Claim 1, further comprising a Vehicle-to-Everything (V2X) telematics receiver configured to pre-empt all media and acoustic filtering protocols upon receiving a proximity-based cryptographic safety handshake from a municipal or autonomous vehicle, injecting a spatially directional auditory warning.
- Claim 4: The apparatus of Claim 1, further comprising a cryptographic biometric override protocol, wherein a verified external network administrator can remotely bypass the dynamic attenuation controller to deliver prioritized voice communication directly to the wearable apparatus.
- Claim 5: A method for executing interactive, location-based tokenization through the apparatus of Claim 1, wherein proximity to a commercial network beacon triggers the injection of a directional 3D audio token, the engagement of which is verified by a localized biometric vocal primer.